

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) An image processing method for correcting image distortions ~~caused by oblique imaging in which a tangible object on an object plane is captured from different oblique directions to obtain a plurality of partially overlapping images~~, comprising the steps of:

inputting a plurality of partially overlapping images of a tangible object on an object plane, the plurality of partially overlapping images sharing a common location of the tangible object and being created by capturing the tangible object on the tangible object plane from different directions to the tangible object plane;

determining a feature point of one of the plurality of partially overlapping images corresponding to ~~[[a]]~~ the common location of the tangible object, ~~shared by the plurality of partially overlapping images~~, and determining a matched point of one of the other partially overlapping images corresponding to the feature point so that a direction of the tangible object plane is calculated based on the feature point and the matched point, the tangible object plane being defined by a spatial orientation of the tangible object;

selecting one of the plurality of partially overlapping images as a standard image whose image distortions are to be corrected; and

generating a distortion-corrected image on a projection plane by projecting the standard image onto the projection plane based on the direction of the tangible object plane such that image distortions in the standard image are eliminated.

2. (Currently Amended) The image processing method according to claim 1 wherein in said selecting step, one of the plurality of partially overlapping images is automatically

selected as the standard image based on a ratio of an area of an object region to an entire area of each image.

3. (Currently Amended) The image processing method according to claim 1 wherein in said selecting step, one of the plurality of partially overlapping images is automatically selected as the standard image based on a direction of a straight-line pattern contained in each image.

4. (Currently Amended) The image processing method according to claim 1 wherein in said selecting step, one of the plurality of partially overlapping images is automatically selected as the standard image based on the feature point and the matched point determined by said determining step.

5. (Original) The image processing method according to claim 1, wherein in said selecting step, one of the plurality of partially overlapping images is automatically selected as the standard image based on a calculated direction of the object plane for each of the partially overlapping images.

6. (Currently Amended) An image processing method for correcting image distortions ~~caused by oblique imaging in which a tangible object on an object plane is captured from different oblique directions to obtain a plurality of partially overlapping images~~, comprising the steps of:

inputting a plurality of partially overlapping images of a tangible object on an object plane, the plurality of partially overlapping images sharing a common location of the tangible

object and being created by capturing the tangible object on the tangible object plane from different directions to the tangible object plane;

determining a feature point of one of the plurality of partially overlapping images corresponding to ~~[[a]]~~ the common location of the tangible object, ~~shared by the plurality of partially overlapping images,~~ and determining a matched point of one of the other partially overlapping images corresponding to the feature point of said one of the plurality of partially overlapping images so that a direction of the tangible object plane is calculated based on the feature point and the matched point, the tangible object plane being defined by a spatial orientation of the tangible object;

selecting one of the plurality of partially overlapping images as a standard image that contains a smallest amount of image distortions among the plurality of partially overlapping images; and

combining the other partially overlapping images, which are projected onto an image surface of the standard image with respect to each of the other partially overlapping images, so that a composite image is generated on the image surface so as to correct image distortions in the standard image.

7. (Currently Amended) An image processing apparatus for correcting image distortions ~~caused by oblique imaging in which a tangible object on an object plane is captured from different oblique directions to obtain a plurality of partially overlapping images,~~ comprising:

an input unit inputting a plurality of partially overlapping images of a tangible object on an object plane, the plurality of partially overlapping images sharing a common location of the tangible object and being created by capturing the tangible object on the tangible object plane from different directions to the tangible object plane;

a correspondence detecting unit determining a feature point of one of the plurality of partially overlapping images corresponding to ~~[[a]]~~ the common location of the tangible object, ~~shared by the plurality of partially overlapping images,~~ and determining a matched point of one of the other partially overlapping images corresponding to the feature point of said one of the plurality of partially overlapping images so that a direction of the tangible object plane is calculated based on the feature point and the matched point, the tangible object plane being defined by a spatial orientation of the tangible object;

a standard image setting unit selecting one of the plurality of partially overlapping images as a standard image that contains a smallest amount of image distortions among the plurality of partially overlapping images; and

an image composition unit combining the other partially overlapping images, which are projected onto an image surface of the standard image with respect to each of the other partially overlapping images, so that a composite image is generated on the image surface so as to correct image distortions in the standard image.

8. (Original) The image processing apparatus according to claim 7, wherein said standard image setting unit is configured such that a user is required to select the standard image when taking the original image from one of the oblique directions, and wherein said image processing apparatus further comprises a notification unit which notifies the user that the standard image is currently taken.

9. (Currently Amended) An image processing apparatus for correcting image distortions ~~caused by oblique imaging in which a tangible object on an object plane is captured from different oblique directions to obtain a plurality of partially overlapping images,~~ comprising:

an input unit inputting a plurality of partially overlapping images of a tangible object on an object plane, the plurality of partially overlapping images sharing a common location of the tangible object and being created by capturing the tangible object on the tangible object plane from different directions to the tangible object plane;

a correspondence detecting unit determining a feature point of one of the plurality of partially overlapping images corresponding to ~~[[a]]~~ the common location of the tangible object, ~~shared by the plurality of partially overlapping images,~~ and determining a matched point of one of the other partially overlapping images corresponding to the feature point so that a direction of the tangible object plane is calculated based on the feature point and the matched point, the tangible object plane being defined by a spatial orientation of the tangible object;

a standard image setting unit selecting one of the plurality of partially overlapping images as a standard image whose image distortions are to be corrected; and

a distortion correcting unit generating a distortion-corrected image on a projection plane by projecting the standard image onto the projection plane based on the direction of the tangible object plane such that image distortions in the standard image are eliminated.

10. (Previously Presented) The image processing apparatus according to claim 9, further comprising a plurality of imaging units which respectively input the plurality of partially overlapping images that are generated by taking the tangible object from the oblique directions.

11. (Currently Amended) The image processing apparatus according to claim 9, wherein said standard image setting unit is configured such that one of the plurality of

partially overlapping images is automatically selected as the standard image based on a ratio of an area of an object region to an entire area of each image.

12. (Currently Amended) The image processing apparatus according to claim 9, wherein said standard image setting unit is configured such that one of the plurality of partially overlapping images is automatically selected as the standard image based on a direction of a straight-line pattern contained in each image.

13. (Currently Amended) The image processing apparatus according to claim 9, wherein said standard image setting unit is configured such that one of the plurality of partially overlapping images is automatically selected as the standard image based on the feature point and the matched point determined by said correspondence detecting unit.

14. (Original) The image processing apparatus according to claim 9, wherein said standard image setting unit is configured such that one of the plurality of partially overlapping images is automatically selected as the standard image based on a calculated direction of the object plane for each of the partially overlapping images.

15. (Currently Amended) A computer-readable storage medium storing program code instructions for causing a computer to execute an image distortion correction processing to correct image distortions ~~caused by oblique imaging in which a tangible object on an object plane is taken from different oblique directions to obtain a plurality of partially overlapping images,~~ comprising:

first program code means for causing the computer to input a plurality of partially overlapping images of a tangible object on an object plane, the plurality of partially

overlapping images sharing a common location of the tangible object and being created by capturing the tangible object on the tangible object plane from different directions to the tangible object plane;

~~first~~ second program code means for causing the computer to determine a feature point of one of the plurality of partially overlapping images corresponding to ~~[[a]]~~ the common location of the tangible object, ~~shared by the plurality of partially overlapping images;~~ and to determine a matched point of one of the other partially overlapping images corresponding to the feature point so that a direction of the tangible object plane is calculated based on the feature point and the matched point, the tangible object plane being defined by a spatial orientation of the tangible object;

~~second~~ third program code means for causing the computer to select one of the plurality of partially overlapping images as a standard image whose image distortions are to be corrected; and

~~third~~ fourth program code means for causing the computer to generate a distortion-corrected image on a projection plane by projecting the standard image onto the projection plane based on the direction of the tangible object plane such that image distortions in the standard image are eliminated.

16. (Currently Amended) A computer-readable storage medium storing program code instructions for causing a computer to execute an image distortion correction processing to correct image distortions ~~caused by oblique imaging in which a tangible object on an object plane is captured from different oblique directions to obtain a plurality of partially overlapping images,~~ comprising:

first program code means for causing the computer to input a plurality of partially overlapping images of a tangible object on an object plane, the plurality of partially

overlapping images sharing a common location of the tangible object and being created by capturing the tangible object on the tangible object plane from different directions to the tangible object plane;

~~first~~ second program code means for causing the computer to determine a feature point of one of the plurality of partially overlapping images corresponding to ~~[[a]]~~ the common location of the tangible object, ~~shared by the plurality of partially overlapping images;~~ and to determine a matched point of one of the other partially overlapping images corresponding to the feature point of said one of the plurality of partially overlapping images so that a direction of the tangible object plane is calculated based on the feature point and the matched point, the tangible object plane being defined by a spatial orientation of the tangible object;

~~second~~ third program code means for causing the computer to select one of the plurality of partially overlapping images as a standard image that contains a smallest amount of image distortions among the plurality of partially overlapping images; and

~~third~~ fourth program code means for causing the computer to combine the other partially overlapping images, which are projected onto an image surface of the standard image with respect to each of the other partially overlapping images, so that a composite image is generated on the image surface so as to correct image distortions in the standard image.

17. (Previously Presented) The image processing method of 1, wherein said standard image is projected with a perspective projection matrix operation.

18. (Previously Presented) The image processing method of 6, wherein said other partially overlapping images are projected with a perspective projection matrix operation.



19. (Previously Presented) The image processing apparatus of 7, wherein said other partially overlapping images are projected with a perspective projection matrix operation.

20. (Previously Presented) The image processing apparatus of 9, wherein said standard image is projected with a perspective projection matrix operation.

21. (Previously Presented) The computer readable storage medium of 15, wherein said distortion-corrected image is generated with a perspective projection matrix operation.

22. (Previously Presented) The computer readable storage medium of 16, wherein said other partially overlapping images are projected with a perspective projection matrix operation.

23. (Previously Presented) The image processing method of 17, wherein said perspective projection matrix is calculated based on coordinates of at least four combinations of feature points of the standard image and matched points corresponding thereto.

24. (Previously Presented) The image processing method of 18, wherein a least-square-method is used to find parameters of said perspective projection matrix.

25. (Previously Presented): The image processing method according to 1, wherein the tangible object is an image on a planar object plane.

26. (Currently Amended) The image processing method according to 1, wherein in said selecting, one of the plurality of partially overlapping images is automatically selected as the standard image based on a smallest inclination angle of a viewing direction of the oblique imaging.

27. (New) The image processing method according to claim 1, wherein the projection plane is parallel to the tangible object plane.

28. (New) The image processing method according to claim 1, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane using a same imaging unit.

29. (New) The image processing method according to claim 1, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane at different time instants using a same image unit.

30. (New) The image processing method according to claim 1, wherein the plurality of partially overlapping images are created by moving a same imaging unit to capture the tangible object on the object plane from different directions to the tangible object plane.

31. (New) The image processing method according to claim 6 wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane using a same imaging unit.

32. (New) The image processing method according to claim 6, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane at different time instants using a same image unit.

33. (New) The image processing method according to claim 6, wherein the plurality of partially overlapping images are created by moving a same imaging unit to capture the tangible object on the object plane from different directions to the tangible object plane.

34. (New) The image processing method according to claim 7, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane using a same imaging unit.

35. (New) The image processing method according to claim 7, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane at different time instants using a same image unit.

36. (New) The image processing method according to claim 7, wherein the plurality of partially overlapping images are created by moving a same imaging unit to capture the tangible object on the object plane from different directions to the tangible object plane.

37. (New) The image processing method according to claim 9, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane using a same imaging unit.

38. (New) The image processing method according to claim 9, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane at different time instants using a same image unit.

39. (New) The image processing method according to claim 9, wherein the plurality of partially overlapping images are created by moving a same imaging unit to capture the tangible object on the object plane from different directions to the tangible object plane.

40. (New) The image processing method according to claim 15, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane using a same imaging unit.

41. (New) The image processing method according to claim 15, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane at different time instants using a same image unit.

42. (New) The image processing method according to claim 15, wherein the plurality of partially overlapping images are created by moving a same imaging unit to capture the tangible object on the object plane from different directions to the tangible object plane.

43. (New) The image processing method according to claim 16, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane using a same imaging unit.

44. (New) The image processing method according to claim 16, wherein the plurality of partially overlapping images are created by capturing the tangible object on the object plane at different time instants using a same image unit.

45. (New) The image processing method according to claim 16, wherein the plurality of partially overlapping images are created by moving a same imaging unit to capture the tangible object on the object plane from different directions to the tangible object plane.